NASA Activities

National
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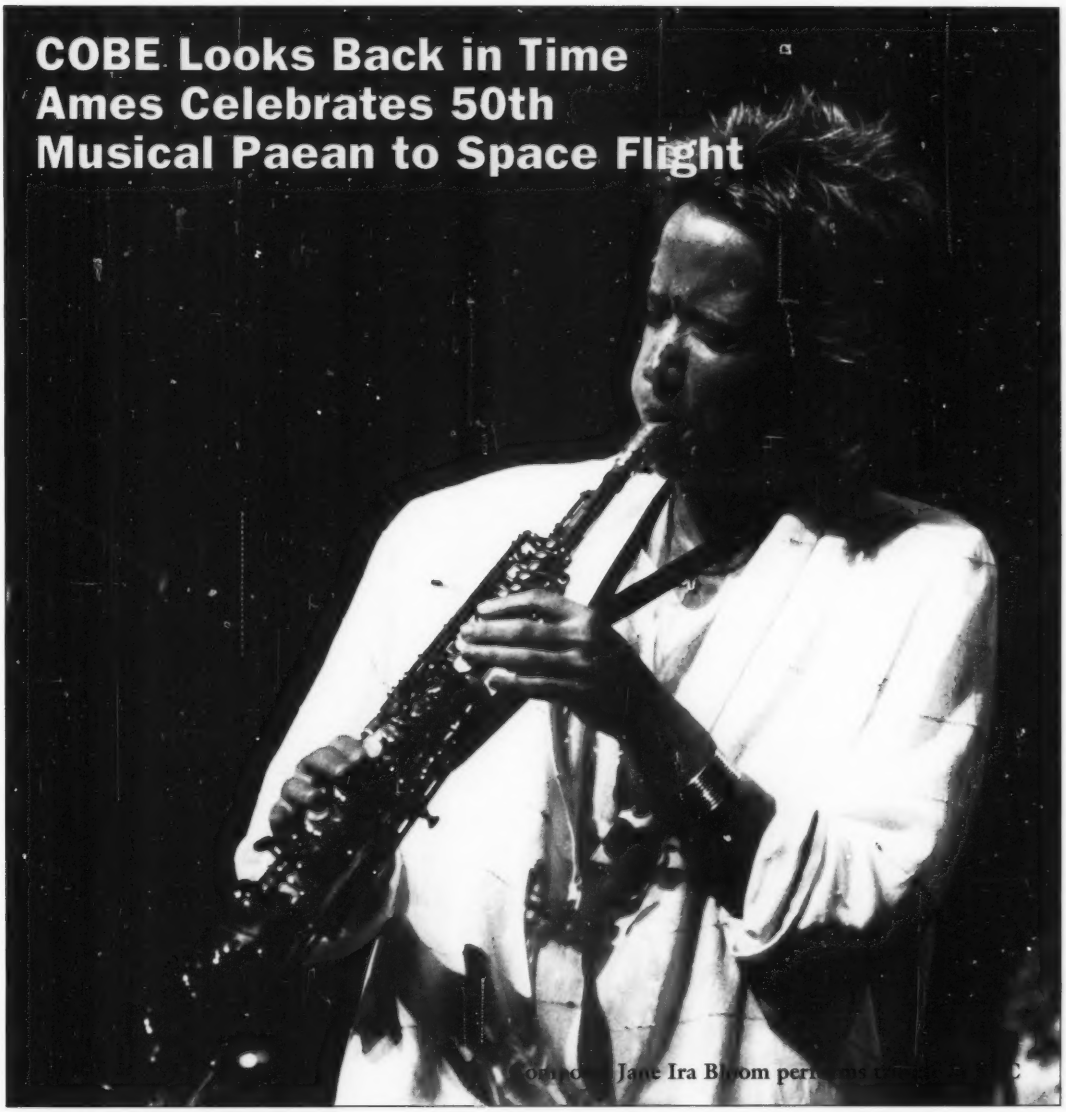
COBE Looks Back in Time
Ames Celebrates 50th
Musical Paean to Space Flight



THIS ISSUE

The necessity of maintaining a budgetary perspective for our nation's space program is addressed by Langley Center Director Richard H. Peterson in this month's "Official Comment". The excerpt is from his recent address at Purdue University.

The Cosmic Background Explorer's departure from a Vandenberg AFB launch pad marks the beginning of its searching of deep space to determine the nature of primeval cosmic dynamics. See more about COBE in "Agency Highlights".

Echos of Voyager 2's fantastic journey continue as JPL reports on Geyser-like phenomena on Neptune's moon Triton.

"Inside NASA" reveals an important aspect of leadership —that leaders never stop learning. Read about the NASA Fellowship program.

Wallops Flight Facility is featured in this month's Center Highlights. The facility offers unique capabilities to flight research and its recent support of a Langley project underscores the point.

Fifty years in support of a broad range of NACA/NASA missions is the proud heritage of the Ames Research Center. Located in the heart of California's scientifically stimulating Silicon Valley, the center continues to prove that its scientific and technological reach and grasp result in the advancement of humankind.

And finally, in a harmonic counterpoint to our usual scientific language, the NASA Art program premieres its first musical composition, a paean to manned space flight by a noted jazz composer/musician. See the **"Q&A"** department and this month's cover.

Next Month:

1989 —On the Road Again!

(Correction: NASA Activities July/August edition should be numbered Vol. 20, No. 7&8.)

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About the Cover

Soprano Saxophonist/Jazz Composer Jane Ira Bloom blows her tribute to manned space flight, "Rediscovery" at its premiere, Sept. 29, 1989 at Kennedy Space Center's Spaceport USA Galaxy Theatre. The first musician to contribute to the NASA fine arts program, Bloom is interviewed in this month's Q&A department.

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We Had a Dream...

By Richard H. Peterson, Director, LaRC

(Excerpts from remarks made at ceremonies honoring Perdue University astronaut alumni, Sept. 29, 1989)

Back in the 1960's, we in NASA had a dream of our future in space. Generally we envisioned Apollo to the Moon in the decade of 60's, the Space Shuttle transportation system in the decade of the 70's, the Space Station and a permanent manned presence in space in the 80's, and perhaps Mars in the 1990's. But somewhere after Apollo, we lost our way.

Early in the 70's, we shut down the Apollo program, slashed NASA funding by two-thirds and proceeded slowly and timidly to develop the Space Shuttle.

The beginnings of the Space Station were even slower. Instead of being operational in the 1980's, we now will not have a Space Station until the late 1990's.

There are many reasons for our slow progress in exploiting space, but fundamentally I believe we simply were not given the resources to run a first-class program. NASA's funding was cut from over 4 percent of the federal budget in the 1960's, to less than 1 percent. In 1990—for the first time in 15 years—it will be slightly more than 1 percent.

Tragically, throughout the 1970's the American public was led to believe that they had the best space program in the world. It is crucial in the future that we either provide the funds to compete as a world class space power, or that we tell Americans the whole truth—that this Country has chosen not to be a world leader in space.

While the U.S. was struggling through the 1970's and early 1980's, three new space powers made large strides. Russia became premier in manned operations in earth orbit. The European community built a strong space program, particularly in commercial launch vehicles. And, Japan moved into contention as a space power. Then came the Challenger accident, a national tragedy and a severe blow to the U.S. space program. We are now back in space and on July 20th of this year— the 20th Anniversary of Neil Armstrong's walk on the Moon—President George Bush committed the country to an exciting world class, space program.

In the decade of the 90's we will launch and begin operations of the Space Station to achieve that long-deferred goal of a permanent manned presence in space for the U.S. Also we will begin a new program called Mission to Planet Earth involving several large platforms in earth orbit with instruments to study the land, the seas, and the atmosphere in detail. Mission to Planet Earth is vital to understanding and dealing with environmental problems such as global warming and ozone depletion to preserve our planet in the next 25 years.

For the decade from 2000 to 2010, President Bush supported NASA's plans to develop and operate a manned base on the lunar surface. It is time to go back to the Moon, to learn to live there for extended periods of time, and to exploit the potential resources which can be obtained from the lunar surface. Finally in the decade of 2010 to 2020 the U.S. will work towards landing astronauts on Mars, the dream of Von Braun, Willy Ley, and many of us here today.

These are exciting plans, and if they are supported, the U.S. will lead the way in space exploration and benefit significantly in prestige and national strength. Our biggest problem is with the short-term focus of our political process and with the large deficits and Gramm-Rudman problems we face each year.

To have a world class space program, we will need to make a long-term investment and double the funding for NASA in the near future, which will be a major political battle. That may sound extravagant, but even after it is doubled, the NASA budget will only be about half as large as it was during the Apollo program.

"Tragically, ... the American public was led to believe that they had the best space program in the world. It is crucial in the future that we either provide the funds to compete as a world class space power, or that we tell Americans the whole truth—that this country has chosen not to be a world leader in space."

I urge all of you to support the President's bold initiative. We must convince Congress that we need significant increases—not just a little bit more each year.

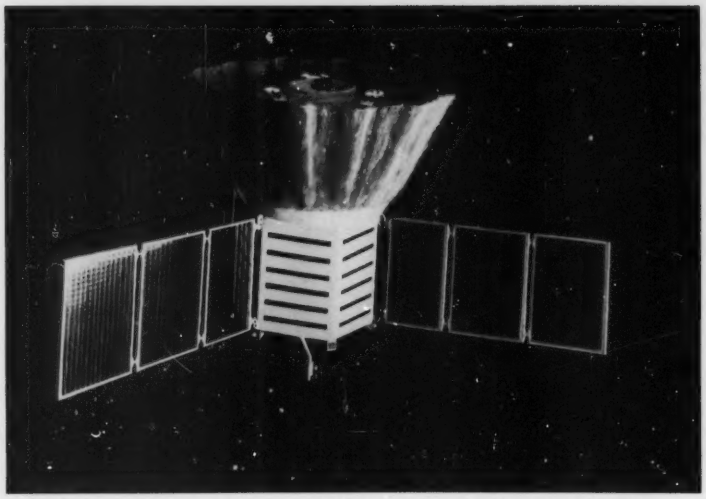
In the 1960's we were optimistic and eager—we were inspired by the vision, energy, and dedication of the Willy Leys, the Werner Von Brauns, and the John Kennedys.

If the U.S. can make the commitment to once more have the world's best space program, then we will lead the world to the Moon and Mars. ... ■

Cosmic Background Explorer to Look Back in Time

To study the origin and dynamics of the universe, including the theory that the universe began about 15 billion years ago with a cataclysmic explosion — the "Big Bang" theory, the Cosmic Background Explorer (COBE) will look out into space and back in time from its orbital space perch, circling the globe in a polar orbit.

By measuring the diffuse infrared radiation (cosmic background) that bombards Earth from every direction, COBE's instruments will help clarify such matters as the nature of the primeval explosion — which started the expansion of the universe and made it uniform — and the processes leading to the formation of galaxies.



COBE plumbs the universe and the past from polar orbit in this artist's conception.

Polar Orbit

From its orbit 559 miles above Earth, COBE carries out its cosmic search using three sophisticated instruments: the Differential Microwave Radiometer (DMR), Far Infrared Absolute Spectrophotometer (FIRAS) and Diffuse Infrared Background Experiment (DIRBE).

DRM will determine whether the primeval explosion was equally intense in all directions. Patchy brightness in the cosmic microwave background would unmask the as-yet-unknown "seeds" that led to the formation of such large bodies as galaxies, clusters of galaxies, and clusters of clusters of galaxies. Measurements of equal brightness in all directions would mean the puzzle of how these systems could have condensed since the Big Bang will be even more vexing than it is today.

To distinguish the emissions of our own Milky Way galaxy from the true cosmic background radiation, DMR will measure radiation from space at wavelengths of 3.3, 5.7 and 9.6 millimeters.

FIRAS, covering wavelengths from 0.1 to 10 millimeters, will survey the sky twice during the year-long mission to determine the spectrum (brightness versus wavelength) of the cosmic background radiation from the Big Bang.

Early Energy Sources

The spectrum that would result from a simple Big Bang can be calculated with great accuracy. Such a spectrum would be smooth and uniform and have no significant releases of energy between the time of the Big Bang and the formation of galaxies. If FIRAS' measurements depart from the predicted spectrum, scientists will know that powerful energy sources existed in the early universe between these times.

These sources may include annihilation of antimatter, matter falling into "black holes," decay of new kinds of elementary particles, explosion of supermassive objects and the turbulent motions that may have caused the formation of galaxies.

FIRAS' sensitivity will be 100 times greater than that achieved so far by equivalent ground-based and balloon-borne instruments. Producing a spectrum for each of 1,000 parts of the sky, the FIRAS data will allow scientists to measure how much light was radiated by the Big Bang.

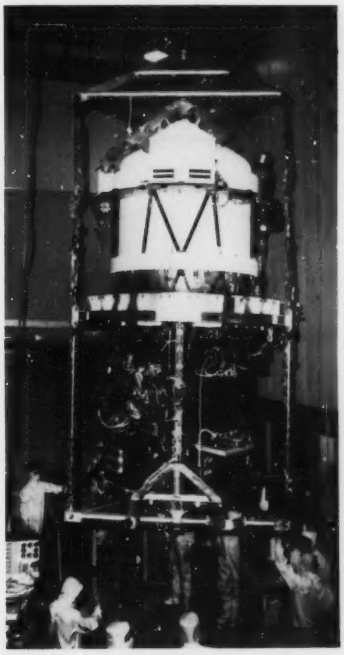
DIRBE will search for the diffuse glow of the universe beyond our galaxy in the wavelength range from 1 to 300 micrometers. In the final analysis, any uniform infrared radiation that remains will be very rich in information about the early universe. One possible source would be light from pri-

mordial galaxies shifted into the far infrared by the expansion of the universe.

Goddard Manages

NASA's Goddard Space Flight Center, Greenbelt, Md., designed and built the 5,000-pound spacecraft and its three infrared- and microwave-measuring instruments. Goddard also will manage the launch and analyze the data returned by COBE during its 1-year nominal mission.

Looking out into space, back in time, the COBE spacecraft will undertake the esoteric task of providing new insights into the origin and evolution of the universe. ■



Engineers and technicians prepare COBE for tests in a Goddard Space Flight Center cleanroom.

Geyser-Like Plume Discovered on Neptune's Moon Triton

A 5-mile-tall, geyser-like plume of dark material has been discovered erupting from the surface of Neptune's moon Triton in images returned to the Jet Propulsion Laboratory, Pasadena, Calif., by NASA's Voyager 2 spacecraft.

The discovery came just as the Neptune encounter — Voyager 2's fourth and final planetary flyby in 12 years — officially ended, October 2, 1989.

This is the first time geyser-like phenomena have been seen on any solar system object, other than Earth, since Voyager discovered eight active geysers shooting sulfur above the surface of Jupiter's moon, Io. The new finding — Voyager's last hurrah in its journey past the planets — augments Triton's emerging reputation as the most perplexing of all the dozens of moons Voyagers 1 and 2 have explored.

Voyager 2's camera captured the eruption shooting dark particles high into Triton's thin atmosphere. Resembling a smokestack, the narrow stem of the dark plume, measured using stereo images, rises vertically nearly 5 miles and forms a cloud that drifts 90 miles westward in Triton's winds.

While Voyager scientists are trying to determine the mechanism responsible for the eruption, one possibility being considered is that pressurized gas, probably nitrogen, rises from beneath the surface and carries aloft dark particles and possibly ice crystals. Whatever the cause, the plume takes the particles to an altitude where they are left suspended to form a cloud that drifts westward.

Voyager 2's working life among the planets may be at an end, but the spacecraft and its twin, Voyager 1, are expected to continue returning information about the various fields and particles they encounter while approaching and eventually crossing the boundary of our solar system. The plutonium-based generators that provide electricity to the spacecraft are expected to keep alive the computers, science instruments and radio transmitter for up to 25 or 30 more years.

The long-lived project is now being dubbed the Voyager Interstellar Mission. The Voyager Project is managed for NASA's Office of Space Science And Applications by the Jet Propulsion Laboratory, Pasadena, Calif. ■

A dark geyser-like eruption shoots vertically five miles into Triton's atmosphere before drifting westward 90 miles and photographed only 16 degrees above the plume-base horizon.

Minority Contractors of the Year Recognized

NASA has recognized two minority contractors for their outstanding contributions to the space agency during ceremonies celebrating Minority Enterprise Week held recently in Washington.

The co-winners of the 1989 Minority Contractor of the Year Award were Analytical Services and Materials (AS&M) of Hampton, Va., and Dual and Associates of Arlington, Va. AS&M was nominated by Langley Research Center, Hampton, Va. and Dual and Associates was nominated by Johnson Space Center, Houston.

Dr. Jalaiah Unnam

AS&M, a supporter of NASA program for six years, provided data acquisition system support for NASA's X-ray diffractometer. The firm has also received special recognition for outstanding technical performance in support of the National Aero-Space Plane program, Space Shuttle o-ring failure analysis, and blade failure analysis.

Since 1986 Dual and Associates has provided unique solutions to specific NASA problems. In order to allow flight controllers to debug fault detection algorithms in real-time, Dual values could be monitored and modified and the operation logic scrutinized. Dual has developed graphics oriented tools that significantly reduce display development time and increase efficiency of building real-time display screens for Johnson Space Center flight controllers. Dual demonstrated the ability to understand complex and diverse areas of Space Shuttleoperations and to apply unique and novel approaches to design, schedules and resource use.

J. Fred Dual

NASA Administrator Richard H. Truly presented the awards to Dr. Jalaiah Unnam, AS& M president, and Mr. J. Fred Dual, president and chief executive officer of Dual, October 3, 1989 at NASA Headquarters. ■

ER-2 Aircraft takes Earthquake Pictures

NASA's ER-2 high-altitude research aircraft has taken aerial photographs of areas affected by the October 17th San Francisco area earthquake. In general support of President Bush's request that federal agencies support earthquake recovery activity, the ER-2 is taking photos of the damage area from Santa Cruz to Marin County.

Operated by NASA's Ames Research Center, Mountain View, Calif., one of the areas affected by the earthquake, the ER-2 flies at an altitude of 65,000 feet and can provide broad area coverage and high-resolution photography. Camera equipment on board would be able to see large-scale natural damage such as landslides or unusual water flow. It also may be able to detect changes in linear features such as fault lines.

Copies of selected earthquake damage assessment photographs will be made available to local, state and federal authorities. ■

NASA To Further Develop Two Explorer Science Spacecraft

NASA has authorized further development for two unmanned scientific spacecraft that would explore interplanetary space and study extragalactic light sources, such as quasars. These studies were submitted to NASA under the Explorer Concept program, designed to develop intermediate-size scientific experiments.

The two programs are: the Lyman Far Ultraviolet Spectroscopic Explorer (FUSE) and the Advanced Composition Explorer (ACE).

FUSE will use high resolution spectroscopy at wavelengths below 1200 angstrom to measure faint sources both throughout the Milky Way galaxy and at very large extragalactic distances. The science team leader for FUSE is Dr. H. Warren Moos, Johns Hopkins University, Baltimore, Md.

ACE will explore the energetic particle populations observed in near-Earth interplanetary space. Measurements of these particles will allow a direct study of interstellar matter. The science team leader for ACE is Dr. E. C. Stone, California Institute of Technology, Pasadena.

The cost for this phase of development, which includes definition studies and preliminary designs, is approximately $3 million for each spacecraft. The Astrophysics Division of NASA's Office of Space Science and Applications, Washington, D.C., will provide overall program management. Goddard Space Flight Center, Greenbelt, Md., will be the project management center. ■

INSIDE NASA

Fellowship Programs Help Develop Future NASA Leaders

By David H. Hornestay, Hq

The Human Resources and Organization Development Office has responsibility for identifying and arranging appropriate developmental experiences for NASA's future leaders.

Fellowship programs range from a one-week university seminar to either a full academic year, or two three-week sessions over the course of a year, separated by an on-site project conducted at the sponsoring organization. There have been 285 participants in the fellowships, both university and non-university-based. External fellowship participants are selected through a rigorous screening process which includes interviews by a panel of top management representatives from across NASA. This Executive Development Education Panel is a subcommittee of the NASA Human Resources Council, and makes recommendations for selection to that Council's Chairman, the Associate Deputy Administrator.

Competition generally is keen since past recipients often have emerged in leadership roles within the agency.

NASA sponsors participants for training funds, as well as travel and subsistence support, with an eye to the best possible return on investment. The list of 1988-1989 participants and fellowship programs below gives an idea of the breadth of subject matter under fellowships, and these formal educational programs represent only one facet of NASA's determined approach to the optimal development of human resources.

NASA Fellowship Participants for the 1988-1989 Academic Year

Carnegie-Mellon Senior Executive Seminar

Glenn C. Fuller, GSFC
Kenneth E. Hodge, ARC
Harlen K. Holmes, LaRC
Ernest R. Tanner, MSFC

Dryden Memorial Fellowship

John H. Cantrell, LaRC

Harvard Advanced Management Program

Lewin S. Warren, Hq
Thomas E. Utsman, KSC

Harvard Mid-Career Master in Public Administration

Sally A. Little, MSFC

Harvard Program for Senior Executive Fellows

Earl E. Van Landingham, Hq

Harvard Program for Senior Managers in Government

George P. Newton, Hq

MIT Center for Advanced Studies in Engineering

Frank Allario, LaRC
Salvatore Cristofano, Hq

Stanford Sloan Fellows Program

Steven N. Sliwa, LaRC

Simmons Middle Management Program

JoAnn Charleston, LeRC
Lana H. Cucarola, MSFC
Nancy L. Gunter, KSC
Susan P. Kroskey, KSC
Nancy E. Sliwa, LaRC
Kelli F. Willshire, LaRC

Syracuse-Maxwell Mid-Career Program

Robert F. LaMere, ARC
John L. Reiss, ARC

Federal Executive Institute

Irving Abel, LaRC
Charles Arcilesi, Hq
Jeremiah F. Creedon, LaRC
Paul McMinco, GSFC
Alan Farrow, Hq
Mary Ann Gaskins, Hq
William D. Hager, Hq
Lee Holcomb, Hq
W. Ray Hook, LaRC
John Horvath, Hq
Robert A. Jones, LaRC
Louis Williams, Hq

CENTER HIGHLIGHTS

Wallops Flight Facility Supports Langley Flight Research

By Jim Elliott, GSFC

Helmet Mounted Visual Approach System Tested

The experiment was designed to test a new concept in aviation: a helmet mounted visual app;roach system that could have applications for future aircraft without cockpit windows. But by the time its was over, the test had proved two things:

1. The use of video cameras mounted on high performance aircraft and helmet-mounted display on pilots' helmets is a feasible concept, and:

2. Goddard's Wallops Flight Facility is an ideal location for aeronautical research. Not only ideal, for some missions it might be the best in the United States.

At least that's the opinion of James R. "Jim" Hall, the Langley project manager for the helmet-mounted display test.

"So far as I'm concerned," he said, it's the best test flight facility in the country."

Hall, a crusty veteran of aeronautical research, explained that more that 200 landings were made during the overall experiment, which used a NASA 737 jet aircraft.

"Using Wallops," Hall said, "we made 173 landings during 20 flights in one two-week period.

"Without the incomparable facilities and the wonderful people who operate them at Wallops, we couldn't have done that anywhere else, even at a flight test facility like Edwards (Edwards Air Force Base, Calif.) or Pax River (Patuxent River Naval Air Station, Md.)

"The other air traffic at those places just wouldn't have allowed that number of flights and that number of landings. It would have taken us three or four times as long to complete the test if we'd been somewhere else."

The experiment, conducted by Langley Research Center and McDonnell Douglas Corporation, made use of Wallops because of runway construction at Langley. However, Langley and Wallops have worked together for years on joint test projects.

Reason for the test was to find out if pilots, using the video cameras and the displays on their helmets, could land a windowless plane—or planes, like the aerospace plane, that are being planned for the future.

Helmet mounted display shows a binocular view of Wallops runway 22 overlaid with flight data information.

The tests were made by two NASA and two McDonnell Douglas pilots, according to Hall.

NASA test pilot Lee Person wears helmet with binocular view optics which show exterior view from two nose mounted video cameras.

Results, he said, indicated that touchdown dispersions using the helmet-mounted display were comparable to those made landing visually.

Hall and the pilots made several recommendations for improving the system that would make it even better, he said. ■

Ames Research Center Golden Anniversary

By Diane F. Stanley, ARC

The year 1989 marks 50 years of major advances in U.S. space and aeronautics at NASA's Ames Research Center — advances like solving the problems of atmosphere entry from space, exploring Jupiter, looking for life on Mars, designing airfield-to-orbit flight vehicles, and listening for messages from extraterrestrials.

Ground-breaking for Ames, the second-founded NASA center, took place on December 20, 1939.

With World War II looming, the country needed a second aeronautical research center. The site at Moffett Field, 45 miles south of San Francisco "with good flying weather all year," was selected.

A series of employee-oriented and public programs has been scheduled during 1989 to mark the Center's 50th anniversary year.

Major Breakthroughs

Some of the country's top scientists and engineers have made Ames' accomplishments. Among them are:

Finding, by theoretical aerodynamicist Harvey Allen in 1952, of how to return vehicles like the Apollo moon craft or ballistic missiles into the atmosphere from space — at a time when no one knew how.

Discovery in 1958, by a group of Ames researchers including Dean Chapman, Clarence Syvertson and Alfred Eggers, of how to use aerodynamic lift for fly

craft, some of them known as lifting bodies, back into the atmosphere to a safe runway landing. This work led to the Space Shuttle.

Planetary Exploration

In 1973, Ames' unmanned Pioneer spacecraft made the first trip to Jupiter — first close-up pictures, and first measurements of the planet. In 1979, researchers repeated the feat at Saturn. A Pioneer orbiter and probes made the first comprehensive exploration of Venus, beginning in 1978. In 1983, Pioneer 10 made the first

flight out of the solar system and is now 4.4 billion miles away, the most distant man made object.

As almost the Center's first job, in 1941-1945, Ames' engineering staff made essential aerodynamic "fixes" in bombers and fighters, such as the P-51 Mustang, critically needed for the war effort.

Computational Flight

By the 1980's, researchers were "flying" aircraft in the world's fastest supercomputers. They were obtaining research results directly — by watching the "real" air flow, calculated at at a billion computations per second, on television screens. Often these designs were for aerospace craft so radical they could not be tested in existing wing tunnels. At speeds higher than 13 times the speed of sound, this computational flight was the only kind of advance testing available. Pioneering this work was Ames' recent director William F. Ballhaus, Jr.

Supercomputer techniques will improve all aircraft design, but they are essential for the airfield-to-orbit-and-back National Aero-Space Plane.

By 1989, the Center had grown to around 5,000 employees, with over 944 acres at two locations, and facilities with a replacement value of $3 billion, including the 80 by 120-foot wind tunnel, the world's largest and the Numerical Aerodynamic Simulator supercomputer system, slated to reach a trillion computations per second by the turn of the century.

Flight Research

Most unique is the 65-square-mile Rogers Dry Lakebed in the Mojave Desert, site of the Ames-Dryden Flight Research Facility. There, NASA's Space Shuttles land and a variety of radical craft from lifting bodies to rocket planes, to the forward swept wing X-29 have been, or currently are, being tested. In 1981, the Dryden facility, until then an independent NASA center, was merged with Ames. ■

Icing Research Tunnel Mods at Lewis Center

One of Lewis' oldest facilities is undergoing modifications which will permit testing of larger engine inlet systems.

The Icing Research Tunnel's (IRT) test section of 6 feet high by 9 feet wide is the world's largest refrigerated icing wind tunnel.

Test section conditions are controllable for airspeed (25 mph to 300 mph), temperature (30 degrees F to -45 degrees F), liquid water content (0.2 g/m3 to 3.0 g/m3), and water droplet size (5 microns to 40 microns).

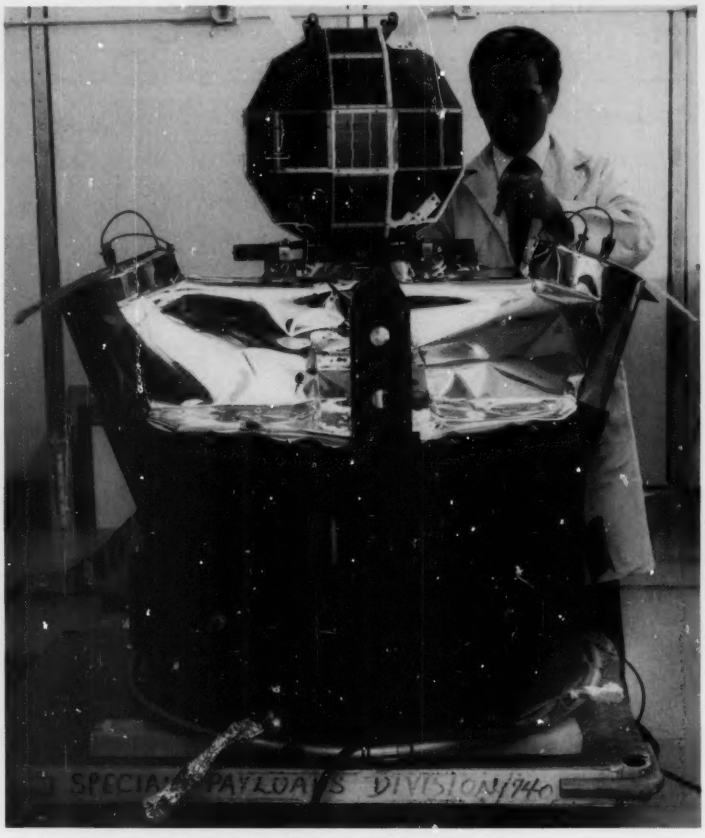
The IRT, which opened for testing in 1944, is used to investigate icing of various air inlets, wing sections, rotorcraft rotors, tail unit surfaces, and numerous instrumentation probes. The facility includes a shop for model preparation and a control room adjacent to the test section.

The tunnel air is cooled by a 2,100 ton cooler managed from the Refrigeration Building, and circulated through the tunnel by a 5,000 HP fan with wooden blades.

In recent years there has been an increased interest in testing larger engine inlet systems in the IRT, which is one of only a few such icing facilities in the country. These larger systems require an altitude exhaust flow capability which exceeds the current system design. This limitation has resulted in an inability to expose some test articles to the required test conditions.

In order to improve the IRT's engine inlet capabilities, larger diameter piping and gas flow measuring systems are being installed. Interfacing with the IRT facility control system, the new system provides greater flow capability with automated exhaust flow measuring and flow control from the IRT control room over a range of three to 80 lbs/sec. The exhaust system is tied into the Center's altitude exhaust system which provides the moving force.

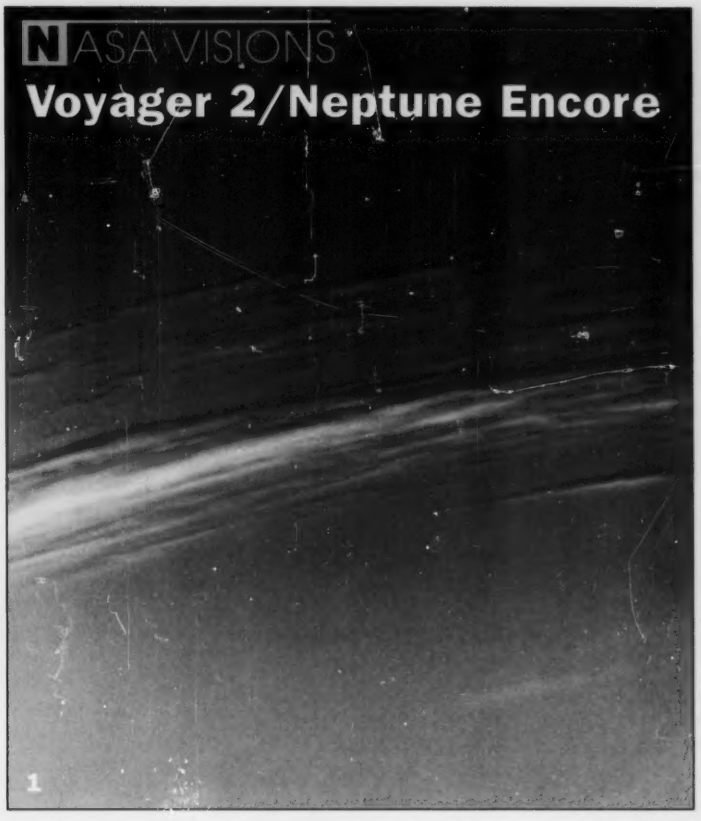
This Facilities Engineering Division project is being managed by Daryl Edwards and implemented through a $240,000 construction contract to McDevitt Mechanical Contractors, Inc. of Cleveland. In-house support is being provided by the Aeropropulsion Facilities and Experiments and Test Installations Divisions. The system is planned to be operational by October 1989. ■

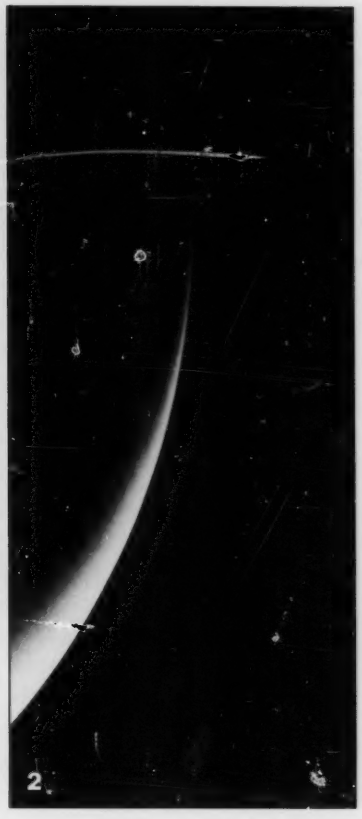


PEGASUS PAYLOAD COMPLETES TESTS —The payload for the B-52 launched Pegasus launch vehicle completed its test and evaluation phase at Goddard Space Flight Center, Greenbelt, Md. The 394-pound payload was designed and built at Goddard in six months. It carries a small Navy experimental communications satellite, the ball-shaped object at the top of the payload, and two cannisters of barium. The barium discharges will be made over central Canada approximately 60 days after launch. Shown here with the payload is Robert Pincus, the Goddard project manager.

NASA VISIONS

Voyager 2/Neptune Encore





As Voyager 2 speeds on to interstellar space, NASA Visions takes one last look at the encounter that culminated the historic Voyager program.

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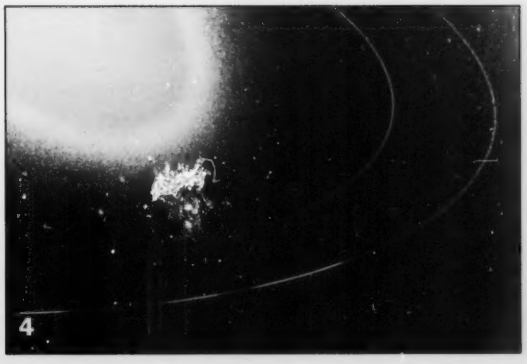
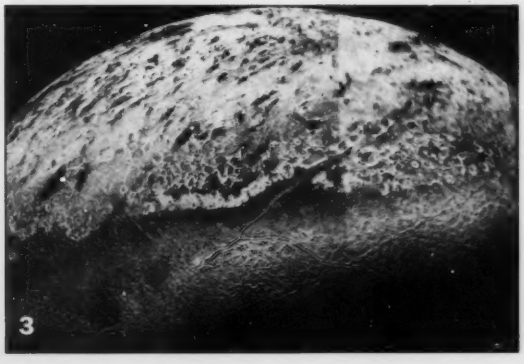
1. Two hours before closest approach to Neptune, Voyager 2 shows bright cloud streaks apparently 30 miles high.

2. Crescent Neptune and Triton at 6.5 hours after closest approach.

3. Voyager 2 high resolution photography revealed Triton's highly reflective, pinkish, southern pole.

4. A wide-angle image shows Neptune's rings in detail. The two main rings, are about 33,000 miles and 39,000 miles from Neptune.





Q&A

The following questions and answers are excerpted from interviews conducted for NASA's radio program, "The Space Story".

Setting Discovery to Music

Artists have covered NASA's space and aeronautics triumphs for 26 years thanks to the NASA Art program. But recently, the work of the Space Shuttle became the subject of a different medium—music. At NASA's John F. Kenndey Space Center, Florida, soprano saxophonist and jazz composer Jane Ira Bloom recently premiered an opus in salute to the Space Shuttle Discovery.

Jazz composer-musician, Jane Ira Bloom performs her manned flight tribute "Rediscovery" at Kennedy Space Center.

Q As a composer and musician, how does one set about to bring the space program to music?

A Jane Ira Bloom collects impressions. She says, "Instead of concentrating on what I see, I try to concentrate just as hard on what I hear. I've come here (NASA Dryden Flight Research Facility for a landing) with a tape recorder and I'm recording source sounds, anything from the sound of a launch or the sonic boom before the landing to the wildlife sounds around the launch pad at Kennedy Space Center or the sound of technicians working in the huge assembly buildings or the machinery working anywhere around the site where the launch is going on.

As the first musician in NASA's fine art program, Bloom joins an impressive number of well known artists such as Jamie Wyeth, Norman Rockwell and Robert McCall who have already contributed to the NASA Art Collection, some of which is on permanent display or on international tour. With a team of artists whose talent encompass painting, color xerography and batik, Bloom spent the better part of a week at the Kennedy Space Center watching support crew prepare for the STS-26 "return-to-space" flight of Discovery.

Q How does being on site help you as an artist?

A Were documenting history and there's a lot of historical precedent for artists being around and for journalists being around when history's being made. And I think painters, photographers, musicians, all artists, have a unique way, a unique vision, of these events that photographs or news articles never come close to. We've had access to see all these things, to go into all these buildings, to meet the people who make things happen on the ground. To me that's a whole other resonance to the sound.

Following her experience in Florida and California, Bloom toiled a full year developing a work that would reflect the sights and sounds of Discovery's return to flight. Bloom say the piece is a voyage from dynamism to grace:

At launch, it's an incredible technical feat that the orbiter is using; great technological strengths are involved to make it break, resist, the forces of gravity. And you feel all that energy involved, and dynamism involved and what that means. ... So I thought of brass, or trumpets or very heroic quality that's in their sound, especially when there's large groups of them and especially when they're playing together. And I thought of what part technology, music technology, would play in the piece and whether I was going to stress that or whether I was going to stress some of the more conventional acoustic sounds that musicians can get through instruments."

On the evening of Friday, September 29, 1989, Jane Ira Bloom's musical tribute to manned flight, entitles "Rediscovery," premiered at Kennedy Space Center's Spaceport USA, marking the first musical opus in NASA's art program. ■

CONGRESSIONAL CORNER

(Congressional Corner is written and edited by the Congressional Relations Office)

The advent of the new fiscal year found most of the federal government, including NASA, operating under a "continuing resolution," a legislativemechanism designed to keep funds flowing temporarily. By October 1, only one of the 13 regular appropriations bills had been signed into law. Last year Congress completed its budget work on time, avoiding the need for a Continuing Resolution or a CR for the first time since 1954.

Although the House had passed all appropriations bills before the summer recess in August, Senate final votes were delayed, at the request of the Republicans, pending bipartisan negotiation over how to fund the increase in the anti-drug effort requested by President Bush in his September 5 drug message. The agreement, reached on September 26, basically requires each department and agency to absorb a .430 of one percent cut, most of which will be of an across-the-board nature. For NASA this translates into approximately $50 million being transferred to the drug war effort. With this agreement in place, the Senate rapidly churned out the backlogged appropriations bills.

The VA, HUD-Independent Agencies Appropriations measure, under which NASA is funded, passed the Senate on September 28 and as of October 16 is pending in a conference committee where the differences in the House and Senate versions will be reconciled. During Senate consideration, no floor amendments were submitted to alter the NASA program funding recommendations of the Commerce Committee. This was in stark contrast to floor action in the House where an attempt was made to reduce Space Station; the House rebuffed this effort by a vote of 125 to 291. The following chart summarizes the appropriations as of October 16, 1989.

The FY 1990 budget picture has been complicated with the October 16 issuance, by the President, of the final sequester order. The sequester order or sequestration is an across-the-board cut in defense and nondefense spending which is triggered when the federal deficit exceeds the annual ceiling set in the Gramm-Rudman-Hollings anti-deficit law, as amended in 1987. The ceiling for fiscal year 1990 is $100 billion - plus a $10 billion cushion. The FY 1990 sequestration for NASA as determined by the Director of OMB is $589 million which will be subtracted from our appropriations bill once it is enacted. It is anticipated that the sequester will be cancelled once the Congress completes action on the appropriations measures and the reconciliation bill which together will meet the FY 1990 deficit target of $110 billion. In 1987, Gramm-Rudman-Hollings cuts were imposed, but the order was cancelled as part of the budget reconciliation bill that Congress cleared late in December.

In sum, when all the budgetary maneuverings have been completed, it is anticipated that NASA's FY 1990 budget will be in the realm of $12 billion. ■

NASA FY 1990 APPROPRIATIONS
(In millions)

	FY 1990 Request	H.R. 2916 as passed House July 20	H.R. 2916 as passed Senate September 28
R&D	$5751.6	$5203.1	$5367.6
SFCDC	5139.6	4709.6	4639.6
CofF	341.8	384.3	341.0
R&PM	2032.2	1957.2	1982.2
I.G.	8.8	8.8	8.8
TOTAL	$13274.0	$12263.0	$12339.2

NASA NEWS CAPSULES

News Capsules are NASA news releases edited by the Internal Communications Branch, Office of Communications.

Private Medical Consultations to Become Space Flight Routine

Medical consultations between astronauts in space and NASA physicians on Earth will become a routine part of future Space Shuttle flights to help improve the understanding and provide timely treatment of initial space motion sickness symptoms.

A private medical communication will be scheduled between Shuttle crew members and Mission Control Center flight surgeons during the pre-sleep periods on the first two days of each flight. Additional consultations may be requested by either the crew or the flight surgeons.

"The communication will assure the most effective treatment of space motion sickness symptoms during the first two days of flight when the condition is most prevalent," said Dr. Jeff Davis, chief of Johnson Space Center's Medical Operations Branch.

"While symptoms vary from one person to another," Davis said, "most cases are mild and constitute little more than an inconvenience to the crew member. Given the variation in symptoms and available treatments, we felt it would be useful to plan routine consultations for the first 2 days of each mission."

The consultations will be confidential because of the physician-patient relationship and privacy laws. ■

Hubble Space Telescope Moves Toward Launch

One of the world's premier, space-based astronomical observatories, scheduled to study the universe for the rest of this century and beyond, was moved a giant step closer to the launch pad in mid-October — literally 2,000 miles closer.

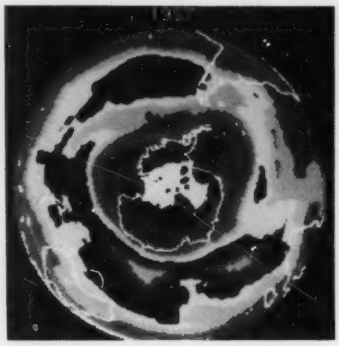
NASA's Hubble Space Telescope was transported from its assembly contractor, Lockheed Missiles and Space Co. in Sunnyvale, Calif., to the Kennedy Space Center, Fla., where it will be prepared for launch aboard the Space Shuttle this Spring.

The 43-foot-long, 24,000-pound telescope made the cross country trip aboard a U.S. Air Force transport aircraft. ■

'89 Ozone Hole Matches '87 Record

Continuing observations by the Total Ozone Mapping Spectrometer (TOMS) have confirmed that the ozone hole over the Antarctic this year has equalled the record-setting hole observed in 1987, according to NASA scientists.

Dr. Arlin Krueger, Dr. Richard Stolarski and Dr. Mark Schoeberl, scientists at the Goddard Space Flight Center in Greenbelt, Md., have been closely monitoring ozone levels over the Southern Hemisphere with the TOMS, an instrument on board NASA's NIMBUS-7 satellite.



1987 ozone hole depicted.

Previous measurements had indicated this year's hole might be as severe as the 1987 hole, and a record low ozone level was reached on Oct. 5. Krueger, the TOMS principal investigator, said, "It's becoming clear that the ozone hole is not going away in the near future, although the depth will vary from year to year." The depth of the ozone hole each year will be determined by meteorological conditions, such as temperature and winds.

Through the first week of October, the ozone hole was nearly identical to the hole recorded two years ago. By Oct. 5, the minimum value within the ozone hole had decreased by approximately 45 percent from early August, a drop of approximately 1.5 percent per day. In contrast, ozone decreased by only 15 percent in September last year, when the ozone hole was relatively weak.

Schoeberl reported that in August and September the polar vortex was extremely cold and undisturbed. According to current theory of the ozone hole, these are the ideal conditions for the formation of the polar stratospheric clouds that lead to ozone depletion.

The NIMBUS-7 TOMS instrument has been measuring stratospheric ozone for more than 10 years as a part of the Earth Science program managed by NASA's Office of Space Science and Applications. To support Antarctic scientists, Goddard has been processing the data from TOMS in near real-time and observations are transmitted to researchers around the world. ■

HUMAN FACTORS

Aldrich Named AA for OAST; Crippen to Head Shuttle

Aldrich

Crippen

NASA Administrator Richard H. Truly has announced two key appointments recently. Arnold D. Aldrich has been named Associate Administrator for the Office of Aeronautics and Space Technology (OAST) and Captain Robert L. Crippen, USN, has been named Director of the Space Shuttle Program.

In his new position, Aldrich will be responsible for the direction of NASA's aeronautics and space technology programs as well as for the institutional management of NASA's Ames Research Center,Mountain View, Calif.; Langley Research Center, Hampton, Va.; and Lewis Research Center, Cleveland. Aldrich is currently Director, National Space Transportation System (NSTS), and provided the program leadership in the safe and successful return to flight of the Shuttle.

In his new role, Crippen will have full responsibility for the operation and conduct of the Space Shuttle program and will report directly to Dr. William B. Lenoir, acting Associate Administrator for Space Flight. Crippen was currently Deputy Director, NSTS Operations.

Administrator Truly commented, "I'm delighted that NASA has two outstanding executives in Arnie Aldrich and Bob Crippen who are so well prepared to take on these important new responsibilities. It speaks well for the inherent strength of the NASA organization. These management changes bode well for a strong future in NASA's aeronautics and technology programs, as well as insure stability in the Space Shuttle leadership."

Aldrich has been associated with the U.S. manned space program almost since its inception, joining the NASA Space Task Group, the forerunner of NASA's Manned Spacecraft Center (later the Johnson Space Center, Houston) in 1959 after graduation from Northeastern University. From 1966 to 1975, he held increasingly responsible positions in the Apollo program.

In 1975, Aldrich joined the Space Shuttle program office where he managed various aspects of the program until his appointment as overall Shuttle program manager in 1985. In November 1986, he was named to his current position as Director, NSTS.

Crippen, a native Texan and a graduate of the University of Texas, is a former Navy carrier pilot and became a NASA astronaut in 1969. He was in the astronaut support crew for the Skylab 2, 3 and 4 missions as well as the Apollo-Soyuz Test Project. Crippen has the distinction of having flown on a record four Shuttle missions, having served as pilot of the first Shuttle flight in April 1981 and commander of three subsequent missions in June 1983 and April and October 1984. ■

Moorehead, Sisson Named to Space Station Freedom Posts

Moorehead

Sisson

Richard H. Kohrs, Director, Space Station Freedom, has announced that Robert W. Moorehead will serve as the Deputy Director, Program and Operations, Space Station Freedom Program Office. James M. Sisson, who has been acting Deputy Director since June, will assume the position of Deputy Manager, Space Station Freedom Program and Operations.

Moorehead was special assistant on the staff of the Director of the Johnson Space Center, Houston, and before that was Manager, NSTS Engineering Integration Office at the Johnson Space Center (JSC), Houston.

As Deputy Director, Program and Operations, Moorehead directs the space station program office, located in Reston, Va., which is responsible for the overall technical direction and content of the international space complex, including systems engineering and analysis and configuration management, budgeting and schedules.

Moorehead has served in various capacities since joining NASA in 1964, including Deputy Manager, Space Transportation System Orbiter and Government Furnished Equipment Projects Office and Manager, Avionics Systems Office at JSC. ■

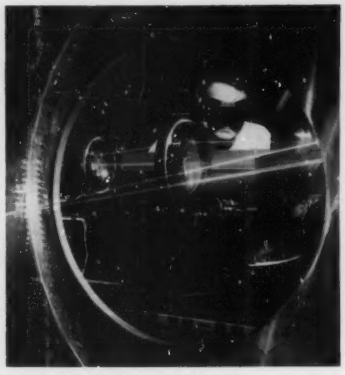
ANOTHER DIVIDEND FROM AIR AND SPACE

Commercial Space Research Leads to Improved Power Supply Device

The Center for Commercial Development of Space Power, Auburn University, Ala., and Maxwell Laboratories, San Diego, Calif., have collaborated to develop a stronger, more efficient power supply for lasers, x-rays, spacecraft and other users.

The advance, which will result in commercial uses of the technology on Earth, represents the first technology "spinoff" from NASA/industry-supported research at the agency's 16 Centers for Commercial Development of Space. Maxwell will produce and market the new product and share revenues with the Auburn center. The system also is expected to be used in future space-based power devices.

The commercial product resulting from the research is a rectangular device, about the size of a stereo receiver, that transforms and conditions large voltages to charge capacitors used in such devices as x-ray systems, lasers, radar and microwave communications equipment. The system is lighter and more compact, reliable and efficient than existing systems that do the same job, according to project engineers.

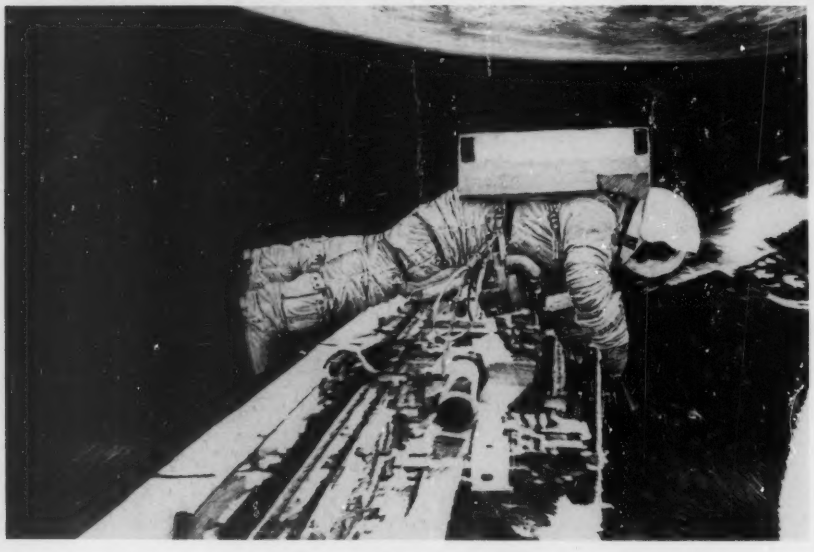


Laser velocimeter aids researchers at NASA's Lewis Research Center.

"The commercial application of this technology is a major breakthrough in system efficiency, compactness and reliability," said Ray Askew, director of the Auburn center. "These features are critical to industrial, medical and space applications."

Conceived for use in space power equipment, work on the system began last year. Researchers on the project soon recognized the potential for spinning off the technology for commercial application on Earth. By late fall, the team had developed several prototype designs. The design was finalized in February and Maxwell is now fabricating production models.

The Auburn center receives grants from NASA's Office of Commercial Programs and other funding and support from industrial partners. ■



"We never stop investigating.
We are never satisfied that we know enough to get by.
Every question we answer leads on to another question.
This has become the greatest survival trick of our species."

—Desmond Morris

("At Work in Space" by Chris Calle–NASA Art Collection)